THAT WHICH IS CLAIMED IS:

1. An optical connector adapter comprising:

a substrate comprising at least one optical waveguide for transporting optical signals, said substrate having opposing ends, and a top reference surface and a side reference surface aligned relative to said at least one optical waveguide;

a respective carrier bracket received over each end of said substrate;

respective substrate alignment fiducials for aligning said carrier brackets relative to said substrate;

a substrate carrier that receives said substrate and carrier brackets;

respective carrier alignment fiducials for aligning said substrate carrier and said carrier brackets;

an optical coupler received on said substrate carrier; and

at least one coupler alignment fiducial for aligning said optical coupler relative to said substrate so that said optical coupler is aligned relative to said at least one optical waveguide.

2. An optical connector adapter according to Claim 1, wherein said optical coupler comprises at least one input for interfacing with at least one optical pump source so that the optical signals being transported through said at least one optical waveguide are amplified.

3. An optical connector adapter according to Claim 2, wherein the at least one optical pump source includes a forward direction optical pump source and a reverse direction optical pump source for said at least one optical waveguide; and wherein the at least one input comprises a first input for interfacing with the forward direction optical pump source and a second input for interfacing with the reverse direction optical pump source.

4. An optical connector adapter according to Claim 1, wherein said substrate comprises a substrate holder having at least one groove formed within the top reference surface for receiving said at least one optical waveguide.

5. An optical connector adapter according to Claim 4, wherein said at least one optical waveguide comprises an optical fiber.

6. An optical connector adapter according to Claim 5, wherein said optical fiber comprises a core surrounded by cladding, and wherein said core comprises doped erbium ytterbium phosphate glass.

7. An optical connector adapter according to Claim 4, wherein said substrate holder comprises at least one of silicon, glass, a molded silica resin composite and ceramic.

8. An optical connector adapter according to Claim 1, wherein said substrate comprises a waveguide substrate, with said at least one optical waveguide being implanted within the top reference surface of said substrate.

9. An optical connector adapter according to Claim 1, wherein said substrate comprises a semiconductor waveguide substrate, with said at least one optical waveguide comprising silica deposited on the top reference surface of said substrate.

10. An optical connector adapter according to Claim 1, wherein each substrate alignment fiducial comprises an alignment pin at an edge defined by the top and side reference surfaces, and is positioned within a corresponding guide hole in said carrier bracket.

11. An optical connector adapter according to Claim 1, wherein each carrier alignment fiducial comprises an alignment pin extending outward from said carrier bracket, and is positioned within a corresponding guide hole in said substrate carrier.

12. An optical connector adapter according to Claim 1, wherein said at least one coupler alignment fiducial is a side surface extension extending from said optical coupler, and is in contact with the side reference surface of said substrate.

13. An optical connector adapter according to Claim 1, wherein said optical coupler comprises at least

one input for receiving optical signals from a direction that is generally traverse with respect to said at least one optical waveguide.

14. An optical connector adapter according to Claim 1, wherein said optical coupler comprises at least one input for receiving optical signals, and comprises·a prism for focusing the optical signals into said at least one optical waveguide.

15. An optical connector adapter according to Claim 14, wherein said optical coupler further comprises an array of diffractive optic elements on a surface of said prism receiving the optical signals.

16. An optical connector adapter according to Claim 1, wherein said optical coupler comprises at least one input for receiving optical signals, and comprises an array of lenslets for focusing the optical signals into said at least one optical waveguide.

17. An optical connector adapter according to Claim 1, wherein said optical coupler comprises at least one input for receiving optical signals, and comprises a GRIN lens for focusing the optical signals into said at least one optical waveguide.

18. An optical connector adapter comprising:

a substrate having at least one groove formed within the top reference surface for receiving at least one optical fiber, the at least one optical fiber for transporting optical signals, said substrate having

opposing ends, and a top reference surface and a side reference surface aligned relative to said at least one optical fiber;

a respective carrier bracket received over each end of said substrate;

respective substrate alignment fiducials for aligning said carrier brackets relative to said substrate;

a substrate carrier that receives said substrate and carrier brackets;

respective carrier alignment fiducials for aligning said substrate carrier and said carrier brackets;

an optical coupler received on said substrate carrier; and

at least one coupler alignment fiducial for aligning said optical coupler relative to said substrate so that said optical coupler is aligned relative to said at least one optical fiber.

19. An optical connector adapter according to Claim 18, wherein said optical coupler comprises at least one input for interfacing with at least one optical pump source so that optical signals being transported through said at least one optical fiber are amplified.

20. An optical connector adapter according to Claim 18, wherein said at least one optical fiber comprises a core surrounded by cladding, and wherein said core comprises doped erbium ytterbium phosphate glass.

21. An optical connector adapter according to Claim 18, wherein said substrate comprises at least one of silicon, glass, a molded silica resin composite and ceramic.

22. An optical connector adapter according to Claim 18, wherein each substrate alignment fiducial comprises an alignment pin at an edge defined by the top and side reference surfaces, and is positioned within a corresponding guide hole in said carrier bracket.

23. An optical connector adapter according to Claim 18, wherein each carrier alignment fiducial comprises an alignment pin extending outward from said carrier bracket, and is positioned within a corresponding guide hole in said substrate carrier.

24. An optical connector adapter according to Claim 18, wherein said at least one coupler alignment fiducial is a side surface extension extending from said optical coupler, and is in contact with the side reference surface of said substrate.

25. An optical connector adapter according to Claim 18, wherein said optical coupler comprises at least one input for receiving optical signals, and comprises a prism and an array of diffractive optic elements on a surface of said prism for focusing the optical signals into said at least one optical fiber.

26. An optical connector adapter according to Claim 18, wherein said optical coupler comprises at least

one input for receiving optical signals, and comprises an array of lenslets for focusing the optical signals into said at least one optical fiber.

27. An optical connector adapter according to Claim 18, wherein said optical coupler comprises at least one input for receiving optical signals, and comprises a GRIN lens for focusing the optical signals into said at least one optical fiber.

28. A method of forming an optical connector adapter comprising:

forming a substrate comprising at least one optical waveguide for transporting optical signals, the substrate having opposing ends, and a top reference surface and a side reference surface aligned relative to the at least one optical waveguide;

positioning a respective carrier bracket over each end of the substrate and aligning the carrier brackets relative to the substrate using respective substrate alignment fiducials;

inserting the substrate having the carrier brackets thereon into a substrate carrier, and aligning the substrate carrier and the carrier brackets using respective carrier alignment fiducials; and

positioning an optical coupler on the substrate carrier and aligning the optical coupler relative to the substrate using at least one coupler alignment fiducial so that the optical coupler is aligned relative to the at least one optical waveguide.

29. A method according to Claim 28, wherein the optical coupler comprises at least one input for interfacing with at least one optical pump source so that the optical signals being transported through the at least one optical waveguide are amplified.

30. A method according to Claim 28, wherein the at least one optical pump source includes a forward direction optical pump source and a reverse direction optical pump source for the at least one optical waveguide; and wherein the at least one input comprises a first input for interfacing with the forward direction optical pump source and a second input for interfacing with the reverse direction optical pump source.

31. A method according to Claim 28, wherein forming the substrate comprises forming a substrate holder having at least one groove formed within the top reference surface for receiving the at least one optical waveguide.

32. A method according to Claim 31, wherein the at least one optical waveguide comprises an optical fiber.

33. A method according to Claim 32, wherein the optical fiber comprises a core surrounded by cladding, and wherein the core comprises doped erbium ytterbium phosphate glass.

34. A method according to Claim 31, wherein the substrate holder comprises at least one of silicon, glass, a molded silica resin composite and ceramic.

35. A method according to Claim 28, wherein forming the substrate comprises forming a waveguide substrate, with the at least one optical waveguide being implanted within the top reference surface of the substrate.

36. A method according to Claim 28, wherein forming the substrate comprises forming a semiconductor waveguide substrate, with the at least one optical waveguide comprising silica deposited on the top reference surface of the substrate.

37. A method according to Claim 28, wherein each substrate alignment fiducial comprises an alignment pin at an edge defined by the top and side reference surfaces, and is positioned within a corresponding guide hole in the carrier bracket.

38. A method according to Claim 28, wherein each carrier alignment fiducial comprises an alignment pin extending outward from the carrier bracket, and is positioned within a corresponding guide hole in the substrate carrier.

39. A method according to Claim 28, wherein the at least one coupler alignment fiducial is defined as a side surface extension extending from the optical

coupler, and is in contact with the side reference surface of the substrate.

40. A method according to Claim 28, wherein the optical coupler comprises at least one input for receiving optical signals from a direction that is generally traverse with respect to the at least one optical waveguide.

41. A method according to Claim 28, wherein the optical coupler comprises at least one input for receiving optical signals, and comprises a prism and an array of diffractive optic elements on a surface of said prism for focusing the optical signals into the at least one optical waveguide.

42. A method according to Claim 28, wherein the optical coupler comprises at least one input for receiving optical signals, and comprises an array of lenslets for focusing the optical signals into the at least one optical waveguide.

43. A method according to Claim 28, wherein the optical coupler comprises at least one input for receiving optical signals, and comprises a GRIN lens for focusing the optical signals into the at least one optical waveguide.